

Title (en)

APPARATUS FOR GENERATING PHOTON COUNTING SPECTRAL IMAGE DATA

Title (de)

VORRICHTUNG ZUR ERZEUGUNG VON PHOTONENZÄHLUNGSPEKTRALBILDDATEN

Title (fr)

APPAREIL DE GÉNÉRATION DE DONNÉES D'IMAGE SPECTRALE DE COMPTAGE DE PHOTONS

Publication

**EP 3838154 A1 20210623 (EN)**

Application

**EP 19216582 A 20191216**

Priority

EP 19216582 A 20191216

Abstract (en)

The present invention relates to an apparatus (10) for generating photon counting spectral image data, comprising: an input unit (20); a processing unit (30); and an output unit (40). The input unit is configured to receive non-photon counting X-ray spectral energy data. The processing unit is configured to implement a deep learning regression algorithm to generate photon counting X-ray spectral data, and the generation comprises utilization of the non-photon counting X-ray spectral energy data. The output unit is configured to output the photon counting X-ray spectral data.

IPC 8 full level

**A61B 6/03** (2006.01); **A61B 6/00** (2006.01); **G06N 3/04** (2006.01)

CPC (source: EP US)

**A61B 6/032** (2013.01 - EP); **A61B 6/482** (2013.01 - EP); **A61B 6/5211** (2013.01 - EP US); **G06N 3/045** (2023.01 - EP US); **G06N 3/08** (2013.01 - EP US)

Citation (applicant)

- J. HSIEH: "Computed Tomography: Principles, Design, Artifacts, and Recent Advances", SPIE, 2015
- T. R. C. JOHNSON: "Dual-Energy CT: General Principles", AM. J. ROENTGENOL., vol. 199, no. 5, November 2012 (2012-11-01), pages S3 - S8
- C. H. MCCOLLOUGHS. LENG. YUJ. G. FLETCHER: "Dual- and Multi-Energy CT: Principles, Technical Approaches, and Clinical Applications", RADIOLOGY, vol. 276, no. 3, 2015, pages 637 - 653, XP055452767, DOI: 10.1148/radiol.2015142631
- PHYS. MED. BIOL., 2007
- E. ROESSL: "Sensitivity of photon-counting based K-Edge Imaging in X-ray computed tomography", IEEE TRANS. MED. IMAGING, 2011
- H. HETTERICH ET AL.: "Phase-Contrast CT: Qualitative and Quantitative Evaluation of Atherosclerotic Carotid Artery Plaque", RADIOLOGY, 2014
- M.J. WILLEMINK ET AL.: "Photon-counting CT: Technical Principles and Clinical Prospects", RADIOLOGY, vol. 00, 2018, pages 1 - 20
- S. LENG ET AL.: "Photon-counting Detector CT: System Design and Clinical Applications of an emerging Technology", RADIOGRAPHICS, vol. 39, 2019, pages 729 - 743
- L. C. CHENG. PAPANDREOU. KOKKINOS. MURPHY. L. YUILLE: "DeepLab: Semantic Image Segmentation with Deep Convolutional Nets, Atrous Convolution, and Fully Connected CRFs", IEEE TRANS. PATTERN ANAL. MACH. INTELL., 2018
- O. RONNEBERGER. FISCHER. BROX: "U-Net: Convolutional Networks for Biomedical Image Segmentation", MICCAI, 2015
- F. YU. KOULTON, MULTI-SCALE CONTEXT AGGREGATION BY DILATED CONVOLUTIONS, 2016
- H. CHEN ET AL.: "Low-dose CT via convolutional neural network", BIOMEDICAL OPTICS EXPRESS, vol. 8, no. 2, 2017, pages 679 - 694, XP055445363, DOI: 10.1364/BOE.8.000679
- KINGMA. L. BA, ADAM: A METHOD FOR STOCHASTIC OPTIMIZATION, 2015
- I. J. GOODFELLOW ET AL., GENERATIVE ADVERSARIAL NETWORKS, June 2014 (2014-06-01)

Citation (search report)

- [X] US 2019251713 A1 20190815 - CHEN GUANG-HONG [US], et al
- [X] LISHA YAO ET AL: "Direct Energy-resolving CT Imaging via Energy-integrating CT images using a Unified Generative Adversarial Network", ARXIV.ORG, CORNELL UNIVERSITY LIBRARY, 201 OLIN LIBRARY CORNELL UNIVERSITY ITHACA, NY 14853, 14 October 2019 (2019-10-14), XP081512786

Cited by

EP4198877A1; WO2023117654A1

Designated contracting state (EPC)

AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR

Designated extension state (EPC)

BA ME

DOCDB simple family (publication)

**EP 3838154 A1 20210623**; CN 114901148 A 20220812; EP 4076198 A1 20221026; US 2022409159 A1 20221229; WO 2021122843 A1 20210624

DOCDB simple family (application)

**EP 19216582 A 20191216**; CN 202080087795 A 20201216; EP 2020086570 W 20201216; EP 20833796 A 20201216; US 202017781142 A 20201216